

# Course Summary

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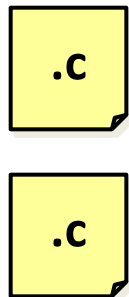


# Computer Systems

system utilities

shell  
vi  
make  
gdb

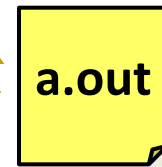
prog. language



compiler

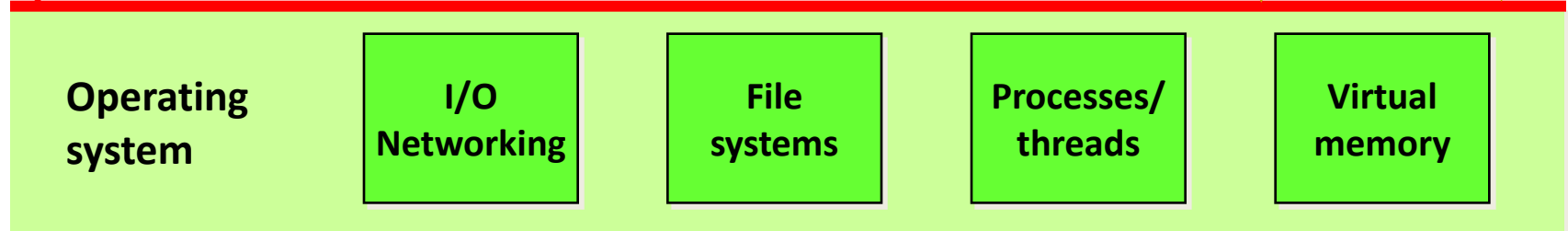
assembler

linker



loader/dynamic linker

system call interface



Binary representation  
Byte ordering  
Instruction Set Architecture (ISA)  
Memory Management Unit (MMU)  
Pipelining



CPU

Memory hierarchy

locality  
caching

# Performance Issues



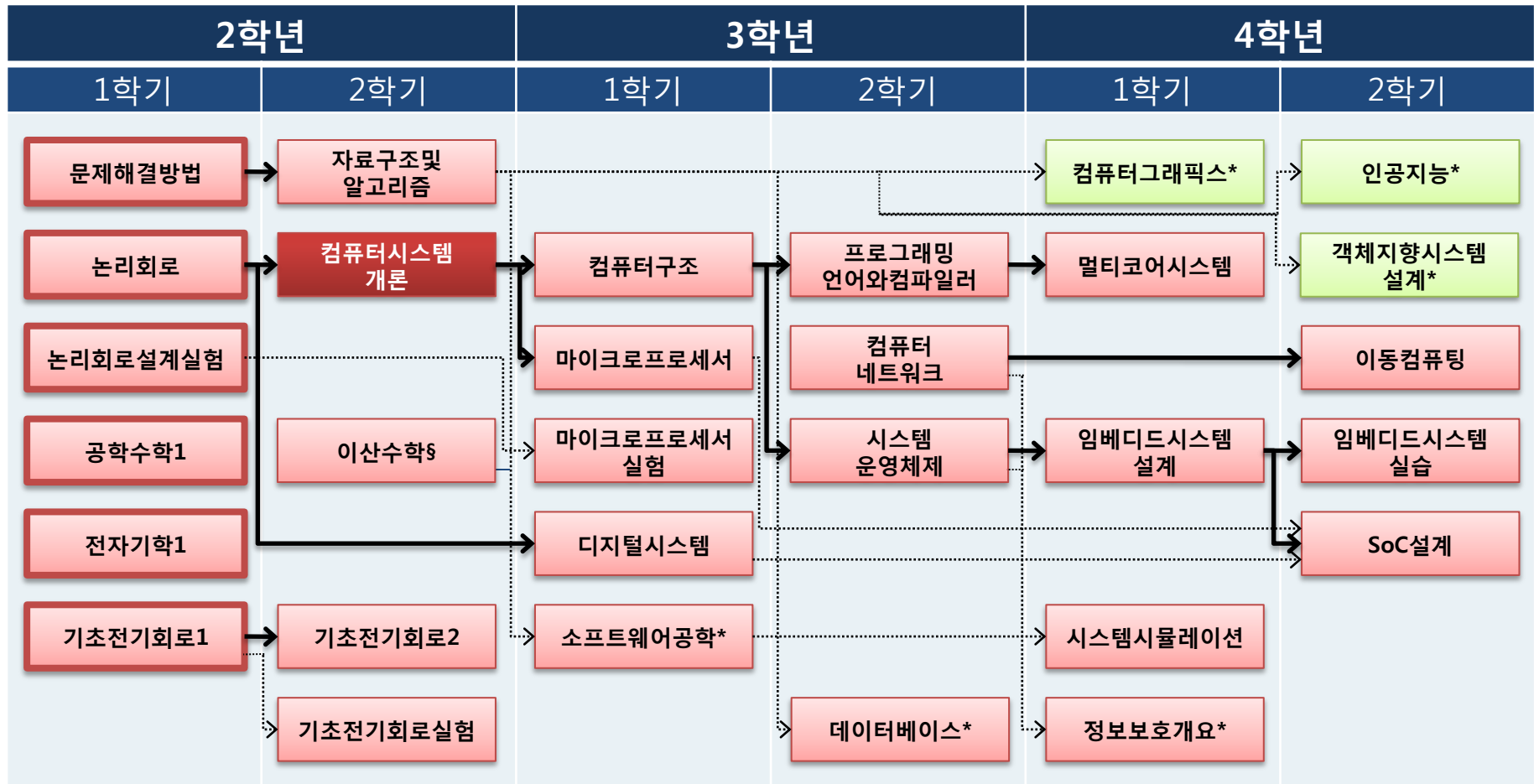
- **There's more to performance than asymptotic complexity.**
  - Constant factors matter too!
    - Easily see 10:1 performance range depending on how code is written.
    - Must optimize at multiple levels: algorithm, data representation, procedures, and loops
  - Must understand system to optimize performance
    - How programs are compiled and executed.
    - How to measure program performance and identify bottlenecks.
    - How to improve performance without destroying code modularity and generality.

# Well...

The end ??

No! It is the **beginning** of many important  
courses you **MUST** take!!!

# 반도체시스템공학전공 내 시스템 소프트웨어 트랙 로드맵



\*표시는 컴퓨터공학전공 개설 교과목. §이산수학은 학부대학 교양과목으로 수강이 적극 권장됨.  
4학년 교과목 중 컴퓨터그래픽스, 인공지능, 객체지향시스템설계는 필요에 따라 선택적으로 수강

주요 진출 분야: 시스템 소프트웨어 엔지니어 및 연구원

(휴대폰, 스마트폰, Digital TV, 플래시 메모리 카드, SSD 등 다양한 임베디드 시스템을 위한 운영체제 개발/이식, 디바이스 드라이버 개발, 성능/전력소모/신뢰성 향상을 위한 소프트웨어 최적화, 새로운 응용 및 서비스 개발 등의 업무 수행)

# Want More?

## ■ Computer Architectures

- How to design an Instruction Set Architecture (ISA)?
- How to build a high performance processor?

## ■ Programming Languages

- Means for high-level programming

## ■ Compilers

- Bridging the Semantic Gap
- Machine-independent optimizations
- Machine-dependent optimizations

## ■ Operating Systems

- Provides system calls for application programming
- Resource sharing & management: CPU, memory, devices, etc.

## ■ Computer Networks

- How to make the communication between machines work?

## ■ Database Systems

- One of serious applications that needs systems-level support

## ■ Embedded Systems

- Special purpose
- Limited resources
- Low-power requirement

## ■ Distributed Systems

- Applications and services that span multiple computers

# Last Reminder..



- **Final exam: 12/14 (Wednesday)**

- 15:00 – 16:30 @ #400126
- Closed-book exam

- **Scope**

- Chap. 1, 2, 3
- Chap. 7.1 – 7.4, 7.8 – 7.10
- Chap. 8.1 – 8.5
- Chap. 10, 11.1 – 11.4
- Chap. 12.1, 12.3 – 12.8
- Lecture slides